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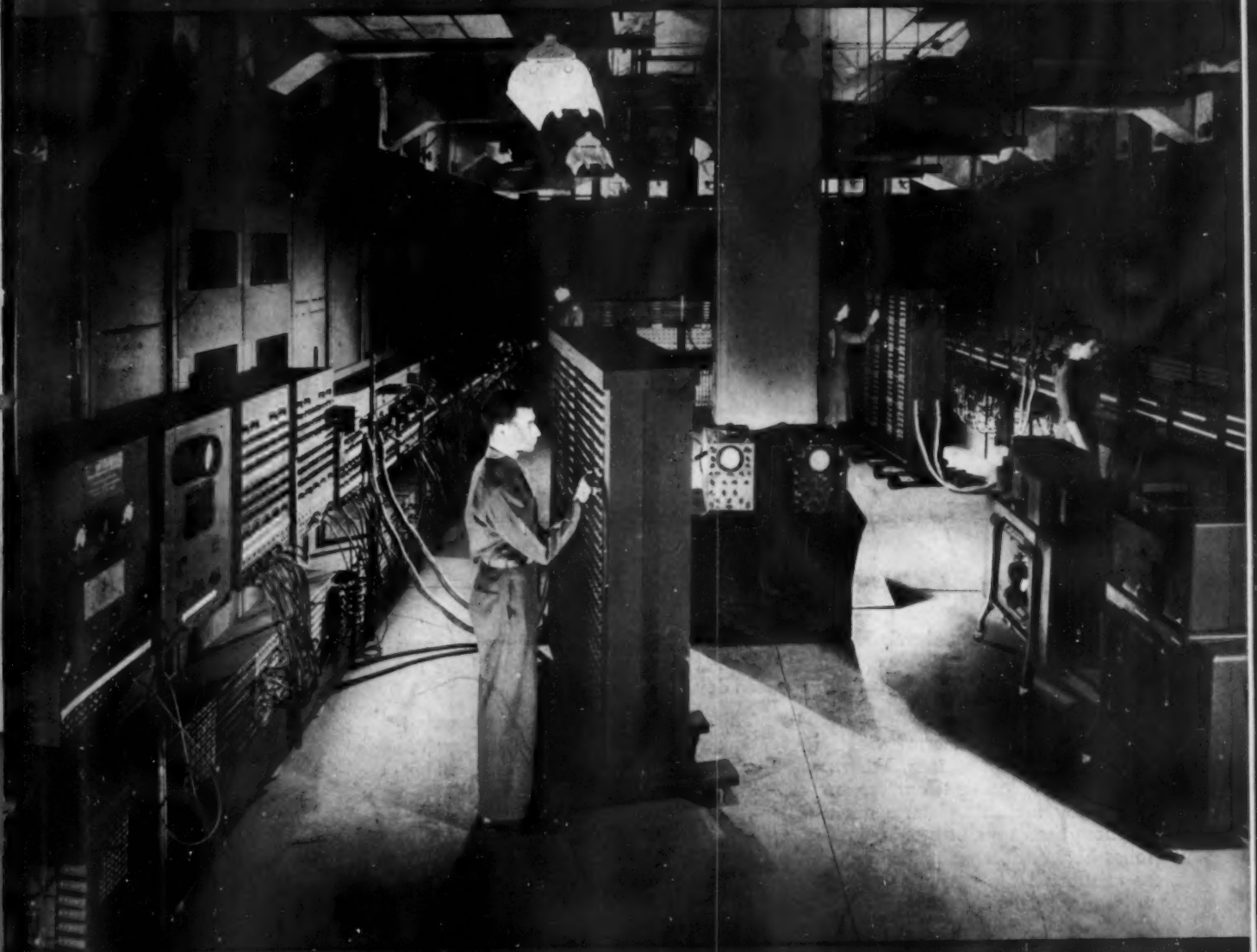
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE • FEBRUARY 23, 1946



Adds Quickly

See Page 118

A SCIENCE SERVICE PUBLICATION

TWENTY-FIFTH ANNIVERSARY 1946

Radio relay towers, about 50 miles apart, will gradually replace thousands of miles of telegraph poles and wires.

Now, telegrams "leapfrog" storms through RCA Radio Relay

With the radio relay system, developed by RCA, Western Union will be able to send telegraph messages between principal cities without poles and wires.

"Wires down due to storm" will no longer disrupt communications. For this new system can transmit telegrams and radiophotos by invisible electric microwaves. These beams span distances up to fifty miles between towers and are completely unaffected by even the angriest storms.

When large numbers of communications circuits are required, these automatic radio relay systems are more efficient than the pole and wire system . . . are less costly to build and maintain. They'll be particularly useful, too, in areas such as China and South America where distances are great and long-line services have not been developed.

This revolutionary stride in communications was made possible by research in RCA Laboratories—the same "make it better" research that goes into *all* RCA products.

And when you buy an RCA Victor radio or television set or a Victrola* radiophonograph, you enjoy a unique pride of ownership. For you know, if it's an RCA it is one of the finest instruments of its kind that science has achieved.

Radio Corporation of America, RCA Building, Radio City, New York 20, N. Y. . . . Listen to The RCA Victor Show, Sundays, 4:30 P.M., Eastern Time, over the NBC Network.

Research in microwaves and electron tubes at RCA Laboratories led to the development by the RCA Victor Division of this automatic radio relay system. Here is a close-up view of a microwave reflector. This system holds great promise of linking television stations into networks, as well as relaying other forms of electric communications.

RCA **RADIO CORPORATION of AMERICA**

*Victrola, T. M. Reg. U. S. Pat. Off.

AERONAUTICS

"Push-Button" Flying

First fully automatic flight control device is being tested by Air Technical Service Command. Has been installed on C-54 "Skymaster."

➤ THE FIRST FULLY automatic flight control device is now being tested by the Air Technical Service Command's All-Weather Flying Center, Columbus, Ohio.

"Push-button" flying is promised by the new instrument which will take off, fly and land an airplane by merely pushing buttons before the take-off to direct its flight. The flight controller, used in conjunction with the A-12 automatic pilot, has been installed in a giant Douglas C-54 "Skymaster" transport for first tests in actual operation.

The new development isn't a radio-controlled plane, but actually an automatic one which permits pre-selection of the course and destination. When the buttons are pushed, according to the ATSC flying experts, the plane will take off, fly a predetermined course to the place indicated by the original button pushed, and land itself automatically.

Designed to permit flights in all weather conditions, the new flight controller is declared to be "the most significant development in flight engineering" by ATSC officials.

Nerve center of the automatic flight controller is the master sequence selector, a huge automatic calculating machine that registers such variable factors as direction, distance and altitude and adjusts the flight of the ship to keep it on its course.

Placed on a runway, the plane using the flight controller can be sent on its way by a button push from the flight dispatcher, it is claimed. The plane's throttle moves up automatically to initiate the take-off. The brakes are unlocked after eight seconds and the plane is on its way.

At 800 feet, the pressure-stat operates to move back the throttle, the wheels are retracted and the aircraft climbs to its cruise altitude. The throttle is moved to cruising speed by the pressure-stat, the magnetic heading control adjusts the plane's course, and the air log records the distance covered in air miles.

As the plane reaches its destination, the air log signals approach to the airport. In landing, ATSC says, the automatically controlled plane comes down to the selected radio compass station. It passes over a cone-of-silence marker that cuts the throttle, while the automatic pilot is being controlled by a compass locator station at the port's outer marker. A down signal fed into the elevator control causes the plane to lose altitude and come in to land in an inbound position. Then the take-off process begins to work in reverse as the plane comes down to 880 feet, report the ATSC engineers.

According to the ATSC flight experts at Wright Field who designed the automatic flight controller, the device is too bulky in its present stage of development to be used for anything but military or experimental purposes. They expect research and invention to make it more compact in time, but they will hazard no guess as to how long will be required to make the flight controller practical for commercial or private flying. Actual performance data on the automatic flight controller are still "classified material" and not available to the public, says the Army.

Emphasizing that the new development is not designed to cut down on the number of flight personnel, the ATSC says no tests have been conducted without pilots and engineers aboard the plane. The inventors of the automatic flight controller say no such tests are contemplated. They envision pilots monitoring the flight controller with engineers checking its performance. For military operations, they add, gunners will still be necessary in combat.

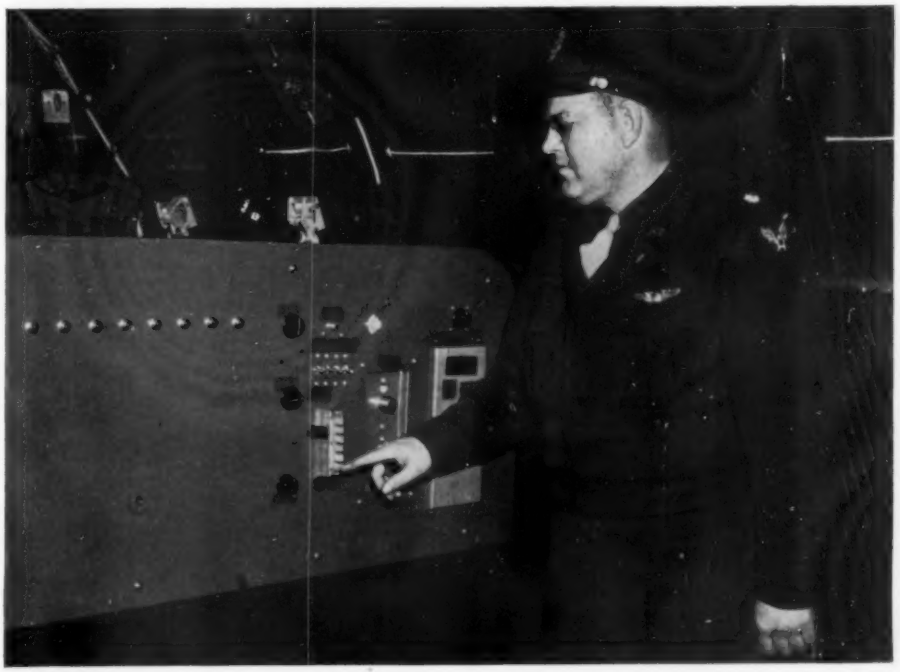
As the first completely automatic flying system, the "push-button" instrument does, however, promise future pilotless airlines for peace and war.

Science News Letter, February 23, 1946

CHEMISTRY-ENTOMOLOGY

DDT-Plus-Rotenone Spray Rids Cattle of Ticks

➤ DDT ALLIED with rotenone, one of the older insecticides, have formed a team that promises to defeat fever-bearing cattle ticks in the tropics. Applied as a fine, mist-like spray, the double-dose killer has cleaned up from 85% to 90% of the ticks on heavily infested animals over a period of a week. Both chemicals



CONTROLS FLIGHT—Push buttons on the Automatic Flight Controller installed in a giant C-54 "Skymaster" cargo plane are explained by Maj. Paul R. Biggers, project engineer on the development of fully automatic flight.

must be used for best effect; neither produces full results if used alone.

Experimental work on the new spray was carried on at the Inter-American Institute of Agricultural Sciences in Costa Rica, under the direction of Robert L. Squibb. The spraying has to be done carefully, to make sure that the droplets reach every skin fold where ticks might hide. When this is done, however, the method seems to be fully as effective as tank dipping, the method hitherto in partial use in tropical American countries. It offers the considerable advantage over dipping that it can be used by any farmer on his home place, and does not involve driving the cattle to the tanks, which are often at quite inconvenient distances.

Science News Letter, February 23, 1946

MARINE BIOLOGY

A-Bomb Versus Fish

Results of test at Bikini atoll on fish and other animal and plant life will be investigated by biologists. Effects on fish considered most important.

➤ WHEN THE ATOM bombs burst over Bikini atoll in the forthcoming experimental explosions they will undoubtedly kill a lot of fish, and may do a good deal of damage to the trees and bushes on shore, and to the birds and other land animals that live among them. How extensive the damage, and how long it takes wildlife to return to a normal state afterwards, will be determined by precise and long-continued surveys that will be carried on by a group of research biologists. Plans for the study of these "bioatomic" effects are now being carefully formulated.

Effects on fish are considered most important. Elmer Higgins, chief fishery biologist of the U. S. Fish and Wildlife Service in Washington, D. C., is acting as liaison officer with the joint Army-Navy group that will conduct the bombing tests. He has designated three marine biologists chosen from the staffs of the Fish and Wildlife Service and the U. S. National Museum, who will concentrate on this one phase of the general problem. They will study the effects, both immediate and long-time, on three ecological groups of fish: inshore, offshore in the lagoon, and offshore in the open ocean.

A careful survey will be made of fish life in the area before the explosions, and at intervals for many months afterwards, to give as complete and continuous a picture as possible. A corps of expert fishermen is being recruited, to serve as assistants to the three biologists. The Navy will land small craft for use in this work, and also seaplanes for scouting schools of fish.

Although fish occupy the No. 1 position in the biological planning, they are by no means the whole story. Biological specialists from several institutions will carry on studies on the plankton, or microscopic plant and animal life that is the ultimate source of all sea food, on the biology and geology of the coral reefs that build all atolls, on the beach and land animals, and on both marine and land plants.

Early objections to the bombing experiments, on the score of possible material harm to commercial fisheries and the whaling industry, have been overcome by the selection of Bikini atoll as the site. The fish here, though abundant enough, are too far from any possible market to be of economic significance, and the little island circle is remote from all known paths of whale migration.

Science News Letter, February 23, 1946

AERONAUTICS

Speed and Altitude of Plane Constantly Shown

➤ HOW HIGH in the air and how fast the plane is travelling will be known at all times by passengers in new giant Lockheed Constellations. Large flight instruments, placed where all may see, will give them the same information that only crew members in the pilot compartment now have. While their natural curiosity is thus being satisfied, their bodily comfort will be aided by a new automatic device that will control cabin temperature, ventilation and pressure.

Both the altitude-speed instrument and the cabin regulator are products of the Kollsman Instrument Division of Square D Company.

The two flight instruments are large and easily read, and are placed on the forward bulkhead. They are entirely self-operative, and are actuated from regular static lines to the standard Kollsman altimeter and airspeed indicator located in front of the pilots on the instrument board.

The cabin control regulator is a fully automatic precision instrument that is set prior to flight. As the Constellation becomes airborne, the regulator begins to function and continually maintains the necessary pressure differential between the cabin and the outside at any altitude, and controls the air temperature. It relieves flight personnel of the duty of adjusting the pressure and temperature as altitude changes.

Science News Letter, February 23, 1946

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DENTISTRY

Preventing Tooth Decay

Anti-caries mouth rinses and tooth powder getting trial as result of discovery of role of ammonia in decay immunity.

➤ HOPE THAT tooth decay may be prevented by use of an ammonia-containing mouth rinse and tooth powder appears in a report which four University of Illinois scientists gave at the meeting of the Chicago Dental Society.

The four scientists are Dr. Robert G. Kesel, Dr. Joseph F. O'Donnell, Dr. Edward C. Wach and Dr. Ernst R. Kirch. The paper announcing their studies won the dental society's annual $500 essay competition award.

Don't start using the household ammonia from the kitchen or the spirits of ammonia in the medicine chest for a private campaign to protect your teeth from decay. Those are not the kinds of ammonia used in the studies. The prescriptions for the anti-caries tooth powder and mouth wash call for ammonia in the form of dibasic ammonium phosphate.

Also, the rinse and powder are still on trial and it will be 18 months to two years before the scientists are sure these can prevent tooth decay. Patients who have been using them say their mouths feel "exceptionally clean" and dental examinations show that their teeth are notably free of white matter and deposits usually present in cases of active decay.

Even more encouraging, those using the ammonia preparations have shown a marked reduction in the number of Lactobacilli acidophilus in their mouths. These micro-organisms are used as a "yardstick" of susceptibility to tooth decay.

The idea for using ammonia compounds to prevent tooth decay came from findings Dr. Kesel and associates announced to scientists in the scientific journal, *Science*, and which were reported in March, 1945. (*See* SNL, March 10, 1945.)

Immunity to caries, or tooth decay, those earlier findings suggested, comes from tiny amounts of ammonia continuously present in the mouth. The ammonia comes from a small group of the protein building-blocks known to scientists as amino acids. The lucky persons who are immune to caries have in their salivas enzymes capable of producing ammonia from certain of these amino acids.

Science News Letter, February 23, 1946

MEDICINE

Tularemia Remedy

Streptomycin lives up to its promise of succeeding in treatment of the disease. The drug speeds recovery, reduces disability time.

➤ STREPTOMYCIN, penicillin's potent ally in the war against germ diseases, is living up to its promise of being a successful remedy for tularemia, or rabbit fever. Its successful use as a remedy for seven tularemia-stricken men and women, following trials on laboratory animals, is reported by Dr. Lee Foshay and Dr. A. B. Pasternack, of the University of Cincinnati College of Medicine. (*Journal, American Medical Association*, Feb. 16.)

Swift change "from a state of wretchedness to one of almost complete comfort," dramatic drops in temperature, recovery time and disability period reduced by more than half, are among the results achieved with streptomycin treatment of the seven patients. All the patients developed tularemia after handling wild rabbits.

"The disease usually causes 31 days of fever, 31 days in bed, a duration of disease of four months characterized by buboes (painful swellings of glands) for 3.5 months, disability for 3.5 months, and a healing time for primary lesions (sores) of 39 days," the Cincinnati physicians point out.

In the first case they report, the patient did not get streptomycin until the eighth day of his sickness. He had altogether, however, only 13 days of fever, 15 days in bed, and a bubo that could be felt for only 16 days. The initial sore on his thumb, although it had been cut open, had healed within 17 days without ulcerating. He was totally disabled for 28 days with partial disability for 1.4 months.

The other patients showed similar improvement, although the time interval to beginning of streptomycin treatment, symptoms and severity of the attack and the time for recovery varied somewhat.

Although serum treatment of tularemia has given good results, these have not been as uniformly good as those with streptomycin in this small group of patients, the Cincinnati physicians observe.

Science News Letter, February 23, 1946

PUBLIC HEALTH

"Army of Health" Urged As Part of Program

➤ TRAINING of more personnel to build up an "army of health" for an aggressive attack on the nation's peacetime health problems is urged by Surgeon General Thomas Parran, U. S. Public Health Service, in the 73d annual report of the service.

Although the nation's health record was good during the war years, with no significant increase in the general death rate and a decline in infant mortality, the reconversion period, Dr. Parran predicts, will bring health "problems comparable in scope and extent with those of the war."

To meet these problems, the Surgeon General recommends expansion and intensification of all preventive services; establishment of basic health organizations staffed with well-trained personnel for every community in every part of the country; addition of cancer control programs and dental care to traditional public health services; establishment of mental health programs at the community level; inclusion of bedside care as a part of the visiting services of all public health nursing programs; continuation by states and communities of environmental sanitation work, carried on during the war through federal appropriations.

Science News Letter, February 23, 1946

Cloth made from grass in China is said to have greater tensile strength and resiliency than ordinary cotton cloth.

What will be probably the largest *concrete dam* ever built is planned to be constructed on the Yangtze river in China; American government engineers have been engaged to assist in design and construction.

MATHEMATICS

Adds in 1/5000 of a Second

General purpose electronic computing machine expected to solve problems of nuclear physics, aerodynamics and scientific weather prediction.

See Front Cover

➤ THE FIRST all-electronic general purpose computer ever developed made its debut at the University of Pennsylvania recently. Capable of adding numbers in 1/5000 of a second, it will help free scientists from time-consuming routine calculations. The machine is shown on the front cover of this SCIENCE NEWS LETTER being prepared to solve a problem in hydrodynamics.

Originally developed to compute lengthy and complicated firing and bombing tables for vital ordnance equipment, the machine is expected to solve equally complex peacetime problems such as those of nuclear physics, aerodynamics and scientific weather prediction. It is capable of carrying out computations 1,000 times faster than the most advanced general-purpose calculating machine previously built.

The most intricate and complex electronic device in the world, the Electronic Numerical Integrator and Computer was built at the Moore School of Electrical Engineering of the University of Pennsylvania for the Army Ordnance Ballistic Research Laboratory at Aberdeen. It contains about 18,000 electronic tubes. Some idea of the machine's complexity can be gained by comparing it with an average home radio set, which has ten tubes. The largest radar set uses 400 tubes, and the B-29 bomber has less than 800 tubes.

The heat generated by the multitude of vacuum tubes is dissipated by a temporary blower system. The noise from such a system will be eliminated, however, when the ENIAC is installed in its specially designed air-conditioned building at its permanent location at Aberdeen Proving Ground. The building is expected to be completed some time this summer.

Two comparatively small machines are used with the ENIAC. One feeds information into the ENIAC from punched cards and the other receives the results from it in a similar manner.

Special equipment allows the circuits to be easily tested. A test bench with its own power supply and electronic oscillographic equipment has been set up so that individual units may be withdrawn and tested without interfering with the operation of the machine.

The ENIAC is estimated to have cost around $400,000. This includes all research and development work involved as well as cost of the equipment. Future machines of this type can be produced much more cheaply. This super computing machine was begun in July, 1943, and finished in the fall of 1945.

The original idea for the electronic general purpose calculator came from Dr. John W. Mauchly of the Moore School faculty. Dr. Mauchly, previously faced with many physical and meteorological problems requiring voluminous calculation, conceived of electronic devices for handling large computing problems in a mass-production manner. J. Presper Eckert, Jr., a recent graduate of the Moore School, joined Dr. Mauchly in elaborating the plans for the ENIAC and took charge of the technical and engineering work.

Capt. Herman Goldstine, mathematician and ballistics expert for Army Ordnance, saw in Dr. Mauchly's plans a powerful tool needed by the Ballistic Research Laboratory for handling its overwhelming computational work and enthusiastically promoted the interest of the Ordnance Department in undertaking its development.

Col. Paul N. Gillon, at that time assistant chief of the research division of the office of the chief of ordnance, enthusiastically sponsored the ENIAC.

Science News Letter, February 23, 1946

PHYSICS

Reflectoscope Detects Flaws in Solid Objects

➤ A SUPERSONIC reflectoscope using sound waves to locate flaws in solid objects has been developed at the University of Michigan and is being produced commercially, reports Dr. Floyd A. Firestone of the departments of physics and engineering research of the University.

Using a quartz crystal covered with a film of oil to contact the object being tested, the reflectoscope radiates sound waves into the material being tested. The radiated waves reflect back to the instrument and are magnified on an oscilloscope screen. Flaws are detected by variations in the visible oscillations on the screen.

The supersonic reflectoscope sends sound waves into the object being tested for periods as short as a millionth of a second. This produces only a few short-length waves that may be easily read on the screen, and it permits the tester to quickly note flaws in materials being examined.

In addition to testing the structure of solids such as iron, steel or aluminum, Dr. Firestone says the supersonic reflectoscope may be used to determine the level of liquids inside tanks.

Science News Letter, February 23, 1946

AGRICULTURE-CHEMISTRY

Large Scale Production Of Sweet-Potato Starch

➤ LARGE-SCALE commercial production of sweet-potato starch will start in Clewiston, Fla., next fall, in the newly completed $7,000,000 plant erected by the United States Sugar Corporation. Annual output of starch is expected to be 75,000,000 pounds; a valuable by-product will be 30,000,000 pounds of stock feed from the spent root pulp.

The starch and its derivatives can be used in a wide range of commercial applications, including food products, adhesives, laundry starch, paper and textile sizings, and even explosives.

More than 12,000 acres of rich Everglades soil will be plowed and planted to sweet potatoes. Not all the acreage is owned by the company; part of the crop will be raised under contract by local farmers on their own land. A new sweet-potato variety, bred for this special purpose, has a considerably higher starch content than ordinary table varieties. Individual roots get to be as big as a man's head, and total yield per acre runs from 500 to 700 bushels.

Full operation had been scheduled to begin in 1945, but a hurricane ruined so much of the crop that some delay in starting was unavoidable.

Science News Letter, February 23, 1946

Canned food 93 years old was found in 1944 on Dealey island in the Arctic north of Canada where it had been placed in a cache by a British ship in 1852; laboratory tests showed some of the food in good condition.

MEDICINE

Heroes of Dogdom

Two mongrels awarded the Whipple Prize for "outstanding services to humanity." Conferred by Surgeon General Kirk for Committee of Scientists.

DOGS REWARDED—Dr. Frieda S. Robbins and Surgeon General Norman T. Kirk of the U. S. Army and the two Dalmatian coach dogs that were awarded the Whipple prize "for outstanding services to humanity."

➤ JOSIE AND TRIXIE, two mongrels who would never win a ribbon at a dog show, have been awarded what might be called the highest prize in dogdom, the Whipple Prize "for outstanding services to humanity."

The award was conferred by Surgeon General Norman T. Kirk, U. S. Army, on behalf of the Sponsoring Committee of Friends of Medical Research. This is a voluntary educational organization sponsored by the New York Academy of Medicine and the Medical Society of the State of New York. The ceremony took place before an audience of distinguished scientists at the American Museum of Natural History in New York.

Josie, aged four, and Trixie, aged one, received the award in recognition of their aid to research on blood plasma which resulted in the saving of many lives on the battlefields.

The award is named for Dr. George H. Whipple, dean of the University of Rochester School of Medicine and Dentistry, who in 1934 shared the Nobel Prize in Medicine for work leading to the liver cure for pernicious anemia.

Although Josie and Trixie are mongrels with no blue ribbon pedigree, they have two distinguished ancestors, grandparents who were used in the fundamental work leading to the discovery of the cure for pernicious anemia.

The parts Josie and Trixie played in the plasma research were described by Dr. Frieda S. Robbins, Dr. Whipple's associate. Josie's work, she explained, has been to donate blood plasma, just as human blood donors have done during the war. This was then given, she said, to other dogs which had deficient red blood cells and blood plasma protein. This determines the production of these substances in the recipient dogs which results from the stimulus of the infusion.

Josie has been so occupied since 1941. Trixie, only a year old, has also made a similar contribution, though only during the one year of her life. But it entitles her to recognition, too, said Dr. Robbins.

"During all this work," she added, "no dog has died except of natural causes."

Describing a "dog's life" in a research laboratory, Dr. Robbins explained how dogs are anesthetized and handled the same as persons undergoing operations, if the research investigation could possibly cause suffering. Rules to this effect, she said, are enforced in laboratories where research is conducted.

"My daily work is with these dogs," she said, "and I seriously resent the statements by uninformed persons that dogs are tortured. To assert that men and women scientists inflict pain on defenseless animals is too preposterous to be believed by anybody who knows the affection which we all have for the dogs who help us."

Science News Letter, February 23, 1946

NUTRITION

Bread Tastes the Same

If you eat the new bread made from 80% flour when blindfolded, you cannot tell the difference between it and the present 70% flour.

By JANE STAFFORD

➤ I HAVE JUST eaten a slice of bread made from 80% flour, the kind Americans will be eating in a few weeks to save wheat for starving people in Europe.

If I had been blindfolded, I could not have told the difference between this bread and the slice I had for breakfast from a loaf bought at the grocery.

Even seeing the bread, it was hard to detect any difference. It looks like white bread. Compared with bread from 70% flour, its whiteness is slightly less snowy.

The bread I ate was an experimental loaf baked by Dr. Lawrence Zeleney, baking technologist of the U. S. Department of Agriculture. It was baked from 80% flour which he milled on a hand-powered mill at the Department's laboratories at Beltsville, Md. He used commercial bread-making technique, and from the same formula baked a loaf of bread with 70% flour for comparison. Bakers will have to use a slightly different formula, or recipe, for 80% flour bread than they are now using.

Housewives may find they can use the 80% flour with little or no change in their favorite recipes. Home economists have not yet experimented with the new flour. Samples of it were on display at the Department of Agriculture in Washington, D. C. Though not quite as snowy white and not quite as silky feeling as the 70% flour on display, the difference seemed to me very slight.

Neither the flour nor the bread baked from it have any specks of bran in them.

This bread, which you will be eating soon after March 1, will, after all, supply just as much nourishment in the form of B vitamins and iron as the enriched white bread Americans have eaten since January, 1943.

The 80% flour does not contain the amount of B vitamins and iron required for enriched bread, but Department of Agriculture officials state that the flour will have to be enriched so that our daily bread will continue to meet the requirements of War Food Order No. 1.

Science News Letter, February 23, 1946

ASTRONOMY

New Exploding Star Duplicating Its Behavior

➤ THE NEW exploding star visible to the unaided eye in the northern heavens (*see SNL,* Feb. 16), is staging an almost perfect duplication of its behavior 80 years ago. Dr. Dean B. McLaughlin of the University of Michigan Observatory said that the fact that the star, I Coronae Borealis, can repeat the earlier performance so closely makes it quite certain that the previous outburst has not altered it appreciably.

The star, previously visible only with a telescope, was first noted without a telescope early in the morning of Saturday, Feb. 9, by Armin J. Deutsch of the Yerkes Observatory of the University of Chicago. Following this report, it was observed at the Michigan Observatory the mornings of Feb. 10 and 11.

Whatever causes the explosion must be beneath the surface of the star, Dr. McLaughlin said. It does not appear likely, however, that it is deep inside, since only a minute fraction of the star's total mass is thrown off as a shell of gas and the remains of the star quiet down in a few years to the same brightness as before the explosion.

T Coronae Borealis, which can be seen after midnight in the northern sky, is the fourth star to be recognized with certainty as a recurrent nova. It seems probable that in the course of time people here on earth will observe repetitions by many more old novae.

Such repeated explosions, Dr. McLaughlin believes, gives a coup de grace to theories of an accidental cause of the nova outburst, such as a collision of two stars, a collision of a planet with a star, or the plunge of a star into a dark nubula. The companion star, a giant red star, takes no part in the violent variations of light.

Science News Letter, February 23, 1946

AERONAUTICS

Blind Landing in Bad Weather Will Be Possible

➤ BLIND LANDING in bad weather will be possible with relative safety for aircraft equipped with a new electronic device which automatically guides a plane to the airway by means of very high frequency radio waves transmitted from ground stations. The new airborne control picks up beamed radio waves from the transmitters and directs the plane to follow them down to the airfield. The device was developed by the Minneapolis-Honeywell Regulator Company.

In use, an official of the company states, a plane, equipped with this specialized radio receiver, is guided in the usual way to within a short distance of the field at which it is to land. When close to the field the electronic device picks up radio waves from marker beacons and indicates this contact by a flashing light. The pilot then throws a switch on the autopilot that immediately puts the plane under flight control of "localizer" beams being continuously transmitted from the airport.

The plane is automatically guided toward the landing strip until a second signal indicates that it has intersected an additional, or "glide path" beam which is also necessary for instrument approach. Throwing another switch puts the plane under control of both the glide path and localizer beam, and steers it toward the landing field at a fixed rate of descent until it contacts the runway.

Science News Letter, February 23, 1946

AERONAUTICS

New Airplane Engine Gives Greater Speed

➤ NEW AIRPLANE engines, the first of the kind ever produced in the United States, will soon be in use in Douglas DC-4 transports and will give these airplanes a 20 to 25 mile-an-hour increase in cruising speed and a payload gain of more than half a ton.

The new power unit can be installed in the DC-4 without modifying the frame of the airplane in any way, being equipped with a prefabricated nacelle that attaches directly to the present DC-4 wing and firewall.

This engine, designed by engineers of the Wright Aeronautical Corporation, will be known as the Cyclone 9HD and is said to be the world's most powerful air-cooled engine per pound of weight in production today. Each engine weighs 1,352 pounds and produces 1,425 horsepower.

Engine maintenance problems also will be simplified by use of the new Cyclone installation. The cowl panel, built in three sections, is held together by special type fasteners that take only a moment to snap open or shut. Rear cowl panels may be quickly opened by removing four pairs of bolts.

Science News Letter, February 23, 1946

IN SCIENCE

GEOLOGY

Crater Lake Volcano Is Not Dangerous

➤ ANY FUTURE eruptions of Mount Mazama, the Crater Lake volcano, probably will not be violent enough to do any damage beyond killing a lot of fish and spoiling the color of the lake.

This is the opinion of Dr. Howel Williams, University of California geology professor, who is one of the foremost authorities on the crater. Dr. Williams studied the crater for five years, and considers it a classical caldera type volcano.

"An eruption of the lake today would not kill people," says Dr. Williams. "Furthermore, I doubt if there is enough activity in the volcano to produce a cone high enough to rise above the level of the lake, which is 2,000 feet deep."

Speculation that the dormant crater might erupt again has been prompted recently by the presence of vapor clouds hovering over the middle of Crater Lake.

Dr. Williams explained that Crater Lake caldera was built up gradually over a period of 60 million years of intermittent activity. Late in its activity the center of the cone collapsed, a characteristic of all calderas, filling in the great void beneath the earth caused by colossal eruptions of magna in the form of pumice. This was how Crater Lake was created.

"Once collapse occurs there is little chance of violent activity in a caldera," Dr. Williams declared, "although occasional periods of minor activity may occur for an indefinite period."

The studies by Dr. Williams show that man entered the Oregon region before the close of the violent period of activity of Mount Mazama. In his studies he found artifacts, such as obsidian knives and arrow tips of an ancient Indian race, buried in deep deposits of pumice near the crater. He places the time of this eruption at 5,000 to 10,000 years ago, after Ice Age glaciers began to recede.

The last eruption of the volcano occurred about 1,000 years ago, when Wizard Island was formed.

Science News Letter, February 23, 1946

CE FIELDS

ENGINEERING

Telephone Operates On Push-Button Principle

➤ AMERICANS of the present generation are used to automatic machinery that works when you push a button. Yet the one mechanism probably most often used, the telephone, departs from the push-button principle: you have to stick a finger or pencil-tip into holes in a dial and turn it around. Putting the automatic telephone on a push-button basis is undertaken in an invention on which U. S. patent 2,394,926 has been issued to Rudolph F. Mallina of Hastings-on-Hudson, N. Y.

On the front of the new instrument, instead of the familiar dial, are ten keys arranged in two banks and numbered from 1 to 0, like the keys of a small adding machine. Within the base, the mechanism is not very much different from that of the dial telephone, for each key is so geared that it turns a master-wheel a different number of spaces. Springs return the mechanism to starting position after each push.

The inventor has assigned his patent rights to the Bell Telephone Laboratories, Inc.

Science News Letter, February 23, 1946

GEOLOGY

Geological Servicemen To Get Retraining

➤ YOUNG GEOLOGISTS who have been so long in the armed forces that their geology may have become a bit rusty are offered on-the-job retraining under a new program that has been set up by the U. S. Geological Survey. This will be available both to members of the Survey who are returning to their jobs after war service, and to new members whom it will be necessary to add to the field forces. The retraining instruction will be limited to the types of operation required in the regular work of the Geological Survey, and expenses will be met out of the Survey's regular funds.

Young geologists whose scholastic or professional training was interrupted by the war are expected to complete this, as far as possible, in regularly established university departments of geology. Scholarships available under the G. I. Bill of Rights can be used for this purpose. Heads of geology departments in a number of leading universities have indicated their willingness to cooperate in the present program by offering study courses pointed especially at the Geological Survey's immediate needs. Among these universities are Chicago, Columbia, Harvard, Johns Hopkins, Princeton and Yale.

Science News Letter, February 23, 1946

ELECTRONICS

Large Lathe Produces Super-Voltage X-ray Tubes

➤ THE WORLD'S largest glass-working lathe, as far as known, has been designed and constructed by the General Electric X-ray Corporation in Chicago, and is now in use producing supervoltage X-ray tubes, including doughnut-shaped tubes for betatrons which may have a capacity of 100,000,000 volts. The lathe weighs two tons.

The lathe is so exactly constructed that it may be called a precision tool. Its spindles have a normal capacity of seven and a quarter inches, but it has a possible swing of 42 inches with special chucks. It can handle any piece of glass up to 84 inches in length, and tubes small enough to pass through its spindles are limited in length only by the size of the room.

The unit is equipped with a system whereby high frequency current will be passed through its heating flames in order to more effectively heat and seal the glass. To withstand the high temperatures used in working with this machine, its heads are equipped with special grease seals capable of withstanding heat up to 200 degrees Centigrade.

Science News Letter, February 23, 1946

GENERAL SCIENCE

Stalin Award Made to Russian Ship Designer

➤ REAR ADM. PETER Papkovich, corresponding member of the USSR Academy of Sciences, has received the first prize of 200,000 rubles for his work in shipbuilding mechanics, in the latest Stalin prize announcement.

A Russian naval veteran, Admiral Papkovich has studied problems of naval architecture and ship strength. His latest work for which the award was made sums up many years of research on ship design.

Science News Letter, February 23, 1946

CHEMISTRY

Blanket Patent on Synthetic Weed-Killers

➤ A PATENT covering a multitude of things that all perform the one function of weed-killing is No. 2,394,916, obtained by Franklin D. Jones of Llanerch, Pa., chemist associated with the American Chemical Paint Company, to which firm he has assigned his rights.

The weed-killers patented by Mr. Jones all belong to the general family of chemicals commonly described as synthetic hormones or growth-promoting substances. In very small doses they act as stimulants; in higher concentration they are deadly to plants on which they are sprayed or dusted. As described in the patent, the herbicides belong to "the group consisting of phenyl, naphthyl, tetralyl, and anthracene monocarboxylic alphatic acids, their salts and esters."

The very sweeping claims made in this patent may provoke some tense legal battles.

Science News Letter, February 23, 1946

CHEMISTRY

Gold Plating Measured By New Method

➤ THE THICKNESS of the gold layer on plated jewelry and other articles may be accurately measured by a new chemical-physical method developed by W. Stanley Clabaugh of the National Bureau of Standards in Washington, D. C. Limited equipment only is required.

In this method a very small sample of the material is cut out with a punch and die. This sample is about 15 ten-thousandths of a square inch in area. It may be of any thickness up to one thirty-second of an inch.

Then the base metal is dissolved away with nitric acid, leaving a small circular piece of the gold. After washing, the gold is dissolved in a few drops of aqua regia and dried. A measured volume of a solution of o-tolidine dissolved in normal sulfuric acid is added to the dried residue.

The gold causes the solution to turn yellow, and the intensity of this yellow color is a measure of the quantity of gold present. Modern scientific methods are used to determine the intensity of the yellow color. Knowing the quantity of gold and the area of the sample, the thickness of the original gold layer is easily calculated.

Science News Letter, February 23, 1946

ASTRONOMY

Mercury and Venus Appear

All five naked eye planets visible during March evenings, though not at the same time. Vernal equinox, the beginning of spring, occurs on March 21.

By JAMES STOKLEY

➤ FOR A FEW DAYS, around March 9, it may be possible during a single evening to see all five of the naked eye planets, though they will not be visible at the same time. Mercury, the most rarely viewed of the five, will be at its greatest distance to the east of the sun on the 9th. Then it will follow the sun in the sky and remain above the horizon after the sun has descended from view. This is not the only time in 1946 that Mercury thus reaches "greatest eastern elongation," as it is called. However, when this occurs in March, near the beginning of spring, it offers the most favorable conditions for viewing Mercury. Then the separation from the sun is in such a direction as to bring the planet high in the sky. At other times it is not much higher than the sun—merely farther to the south. So then, about March 9, or for a few days before or after that date, one may look to the southwest and there see Mercury, as a brilliant point of light, in the gathering dusk. At sunset on the 9th, it will be about 16 degrees above the horizon.

23 Times as Bright

Venus is also coming into view. It has not separated as far from the sun as Mercury on the 9th, but as it is now some 23 times as bright, that will help to make it visible. Venus will appear in the dusk, like Mercury, just after sundown, almost directly west. By the end of the month it will be easier to see than earlier in March. Both of these planets set before the sky gets fully dark, and they are not shown on the accompanying maps, which depict the sky for 10:00 p. m. on the first of the month, and an hour earlier on the 15th.

Three bright planets are shown, however. The brightest is Jupiter, of magnitude minus 1.9, which rises about three hours after sunset, and is then visible the rest of the night. It is in the constellation of Virgo close to the star Spica, which is low in the east at the times for which the maps are drawn. Though Spica is of the first magnitude, Jupiter is about 17 times more brilliant.

High in the south, visible through the night until about two hours before sunrise, are the two bright planets whose dance in the constellation of Gemini, the twins, we have been watching through the winter. They are near the stars Castor and Pollux. Saturn is the brightest of this quartet, of magnitude plus 0.2, about 20% brighter than Mars, which is next. Pollux is about two-fifths as bright as Saturn, and Castor is still fainter.

On March 18, Mars, which is moving eastward through the sky, passes Saturn, the second time in two months. It passed it on Jan. 22, while it was moving toward the west. It turned around on Feb. 21. Saturn, which has recently been moving westward in the sky, is stationary and then starts an easterly motion on March 20.

Brightest star of the evening skies in March is Sirius, the dog star, in Canis Major, the great dog, seen in the southwest. It is just to the left of the prominent constellation of Orion, the warrior. Above Sirius is Canis Minor, the lesser dog, with Procyon, just below Gemini, in which Mars and Saturn appear. In the south is Regulus, in Leo, the lion.

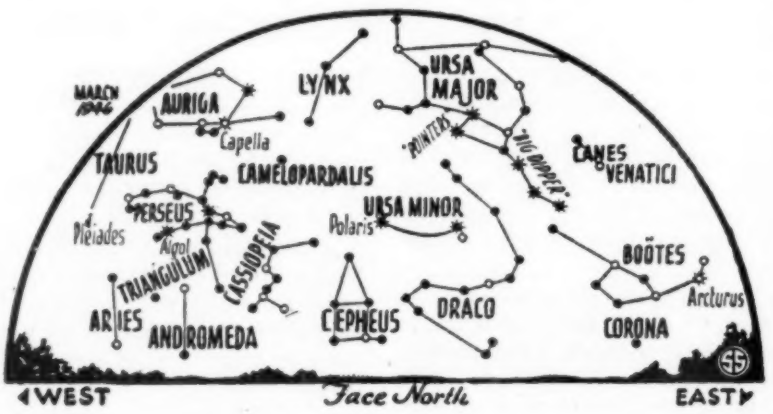
High in the west is Taurus, the bull, with first magnitude Aldebaran and to the right of this figure we see Auriga, the charioteer, in which Capella shines. To the east is Spica, already mentioned as near Jupiter, and nearby, to the left, is Bootes, the bear-driver, with Arcturus.

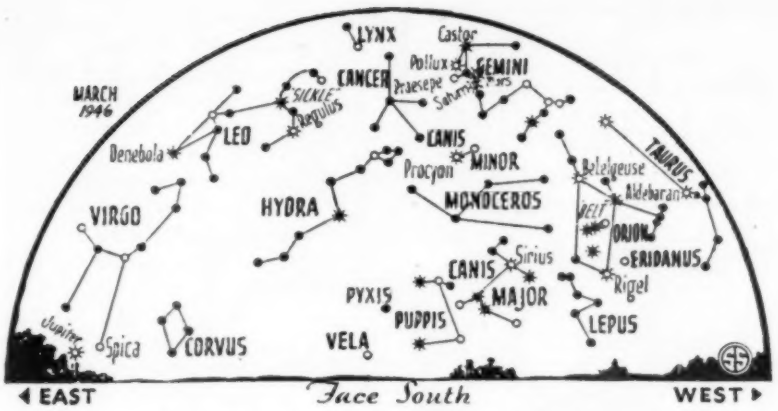
On March 21, at 12:33 a. m., EST, so that it happens on the evening of March 20 in central and westerly parts of the country, the sun, which has been traveling northward through the sky since just before Christmas, reaches the half way mark and stands over the equator. This event is called the vernal equinox, the latter part of the name meaning "equal nights." At this equinox, like the corresponding one six months later, the sun rises directly east, sets directly west, so it is above the horizon just half the 24 hours and below for the same time. That is, it would were it not for the refraction of the earth's atmosphere. This effect, which is like that of a prism, makes the sun seem a little higher than it really is, so that we see it before it rises and after it sets for a short time.

Apparent Movement

But, regardless of that, the vernal equinox is one of four main points in the sun's annual movement around the sky. This is a movement that is only apparent, for the effect is really due to the annual movement of the earth around the sun. At different times of year as we encircle it, we find it standing against an ever-changing background so it appears to be the sun that moves. The path the sun seems to take is called the ecliptic, and it runs through the consellations of Pisces, the fishes; Aries, the ram; Taurus, the bull; Gemini, the twins; Cancer, the crab; Leo, the lion; Virgo, the virgin; Libra, the scales; Scorpius, the scorpion; Sagittarius, the archer; Capricornus, the sea goat and Aquarius, the water bearer. The moon and planets also remain close to the ecliptic, so that its path can roughly be traced from the position of the planets.

The ecliptic is inclined to the equator,





SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS

the line in the sky directly over the earth's equator, so half the ecliptic is in the northern sky and half in the southern. Thus we can get our four main points. Two are the intersections with the equator. These are the equinoxes, where the sun stands about March 21 and Sept. 23. The other two points are the solstices, marking the northernmost and southernmost parts of the ecliptic. The former is where the sun stands on June 21 and the latter where it is on Dec. 22.

As a convenient subdivision of the year, astronomers have long used the passage of the sun through the four quarters of the ecliptic, as marked by the four points mentioned above. These they have called "seasons," and the one between the equinox in March and the solstice in June they call spring. Therefore, in the astronomical sense, spring commences on March 21 at 12:33 a. m., EST.

Of course this is an arbitrary division of the year. People might do it—indeed, they have done it—in other ways. In common speech, for example, we often consider the whole of March, followed by April and May, as spring, and then have summer commencing at the beginning of June. Again, we might call summer the quarter of the year during which it is farthest north, beginning not at the solstice, but half way between the equinox and the solstice, or about May 7, and ending at the mid point between the solstice and the following equinox, or about August 9. Then the June solstice would be the middle, and not the beginning of summer, and we would be following an old practice in England, where June 21 is called "Midsummer day." The events of Shakespeare's "Midsummer Night's Dream" occurred at this time.

However, this practice is not generally used, and the astronomical usage is very widely followed, with spring commencing with the vernal equinox, and summer with the summer solstice. This usage has the advantage of roughly corresponding with the weather, for there is a lag in the seasons as we do not get our warmest weather when the sun is farthest north, but some weeks later.

It is true, of course, that what has been said applies only to the northern hemisphere. In the southern the seasons are reversed. Their autumn comes at the time of our spring, and their winter with our summer. This was the reason, a few years ago, that the "American Ephemeris," an annual volume of astronomical tables published by the U. S. Naval Observatory, stopped making the statement that, for example, spring would begin on the 21st of March. Now they simply state that the equinox or solstice happens on a certain day at a particular time. The book is used in all parts of the world, and so now its statement is as true in South America as it is at home.

Celestial Time Table for March

March	EST	
3	1:01 a. m.	New Moon
6	8:00 p. m.	Moon nearest, distance 227,900 miles
9	11:00 a. m.	Mercury farthest east of sun
10	2:47 a. m.	Algol (variable star in Perseus) at minimum
	7:03 a. m.	Moon in first quarter
12	5:50 a. m.	Moon passes Mars
	8:32 a. m.	Moon passes Saturn
	11:37 p. m.	Algol at minimum
15	8:26 p. m.	Algol at minimum
17	2:11 p. m.	Full moon
18	5:15 p. m.	Algol at minimum
	8:00 p. m.	Mars passes Saturn
19	7:42 p. m.	Moon passes Jupiter
21	12:33 a. m.	Sun crosses equator, spring commences in northern hemisphere.
22	6:00 p. m.	Moon farthest, distance 251,600 miles
25	5:37 p. m.	Moon in last quarter

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, February 23, 1946

Overbaking *potatoes* causes a loss in their vitamin C.

OCEANOGRAPHY

Surf Forecasters Trained During War

➤ SURF FORECASTING was placed on the same kind of scientific basis as weather forecasting by scientists at the Scripps Institution of Oceanography at La Jolla, Calif., and during the war 200 Navy and Marine Corps officers were trained in the new technique, for use in connection with landing operations.

The work was carried on under the immediate supervision of Dr. Harald U. Sverdrup, director of the Institution, with the cooperation of other members of the staff.

"It has been possible to establish a relationship between, on the one hand, higher waves," said Dr. Sverdrup, "and on the other, the wind velocity and the stretch of water over which the wind has been blowing (the fetch) or the length of time the wind has been blowing (the duration).

"The formulation of these relationships, which was accomplished in the summer of 1943, represents the greatest single accomplishment of the project."

Scientific data accumulated during the long studies have been incorporated in two volumes, published by the Hydrographic Office of the Navy.

Science News Letter, February 23, 1946

The *maté tree* or shrub, that supplies perhaps 25,000,000 people with their customary beverage, is a species of the holly.

Tobacco crops in the United States will total for 1945 over 2,000,000,000 pounds, a 4% increase over 1944.

Weather ships are vessels stationed at intervals across the ocean carrying U. S. Weather Bureau observers and instruments; radio reports from them assist in the making of weather forecasts.

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Do You Know?

The *drone bee* has no sting.

Fats are also called lipins from lipos, the Greek word for fat.

Rayon claimed to be stronger than nylon has recently been produced in England.

The characteristic flavor of *butter* is due largely to biacetyl; this compound, which can be derived from sugar by a fermentation process, is responsible for the improved flavor of margarine during the past decade.

Gasoline is to be made from natural gas in a plant to be erected near Texas gas fields, it is reported; the plant, it is said, will use 65,000,000 cubic feet of gas a day to produce 5,000 barrels of gasoline and 1,000 barrels of diesel oil.

Nail-pickers, magnetic bars mounted below trucks to gather up nails, screws, bolts, and other pieces of metal on roads that might puncture tires, are sometimes strong enough to pick up a nail embedded an inch deep in gravel.

Chemical analysis of *exhaust gases* from various gasoline engines show that they vary greatly, the controlling factor being the amount of fuel consumed and the air-gasoline ratio produced by the carburetor adjustment.

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ZOOLOGY

NATURE RAMBLINGS by Frank Thone

Snow-King

➤ AN OLD RIDDLE takes the form of a problem: A hunter left camp, going seven miles straight south. Then he turned straight east and went another seven miles. At the end of this trek he saw a bear, which he killed and skinned. Packing the skin, he went seven miles straight north, which brought him back to camp. What color was the bear?

There is only one correct answer: White. For the only place in the world where a triangular course like the one described would bring you back to the point from which you started is the North Pole. And if hunters ever got as far north as that, the only bears they would find on the ice floes would be polar bears, which are always white.

The polar bear is exceedingly well adapted to its environment. That snowy coat enables it to approach its prey on land with minimum risk of detection, and when swimming in the sea it might easily be mistaken for a floating cake of snow-covered ice. Even in summer, when much of the snow melts off, even in the Arctic, the white coat is still no handicap, for there are always enough residual banks and patches of snow lying about to permit the animal to maintain its white camouflage the year round.

Since the principal food of the polar bear consists of seals and fish, it is usually found near the water, and very often in it. So completely is the animal given to a marine habitat that its very name smells of the sea. Its generic name, *Thallasarctus,* is Greek for "sea-bear," which is further underlined by its Latin specific name, *maritimus.* Zoologists who have observed this bear in its native waters state that it is a tireless swimmer, though not a very rapid one, and is sometimes encountered miles from the nearest land.

It is probably the most completely fur-clad animal in the world. Almost all other mammals, including all other bears, have hairless soles to their feet, but the polar bear is furred on the soles as well as everywhere else. These furry soles apparently give it a considerable advantage in walking on ice and clambering over slippery seaside rocks.

In its native realm the polar bear is undisputed master; there is no animal bigger or stronger, save the bull walrus, which isn't built for aggressive warfare. The only creature the polar bear needs to fear is man—especially man-with-gun. That is why you sometimes see beautiful white bearskin rugs.

Science News Letter, February 23, 1946

HOME ECONOMICS

Thin Honey by Adding Water, Heating Slightly

➤ TO THIN HONEY, which is normally too thick to use in sweetening fruit, dry cereals and iced tea, add a little water and hold over a low flame until the honey and water combine. Avoid high heat which drives off the delicate flavors and is likely to scorch the honey, advise honey experts of the U. S. Department of Agriculture. About a tablespoon of water should be used for each cup of honey.

Thinned honey should be kept in a covered jar in the refrigerator. Like other thin syrups, thinned honey may ferment or mold within a month unless it is kept cold.

Science News Letter, February 23, 1946

Bright noon *sunlight* is perhaps a million times brighter than moonlight.

An exhaustive survey of Japan's *forest* reserves and its forest industries is being made by three American government foresters to determine whether permanent employment can be found for former workers in war industries.

GOLD

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• Books of the Week •

ADOLESCENCE AND YOUTH—Paul H. Landis—*McGraw*, 470 p., illus., $3.75. Shifts the perspective from the internal mechanisms which provoke adjustment problems to the social structure; discusses the problems of the adolescent in the moral, marital and economic fields and recognizes the respective problems of youth groups in town, village and open country.

ALGEBRA: *A Second Course*—R. Orin Cornett—*McGraw*, 313 p., diagrs., $2. A fresh approach to the subject aimed at providing motivation, recognition of significant principles, and mastery of operational techniques.

CAREERS IN FORESTRY—*Dept. of Agriculture—Government Printing Office*, 23 p., illus., 10 cents. U. S. Department of Agriculture, Miscellaneous Pub. No. 249.

CONDUCTORS AND WIRING LAYOUTS—F. S. Lincoln—*Duell*, 342 p., tables and illus., $3. Construction and operation of every type of conductor and conductor insulation, along with instruction for wiring motors, welders, capacitors, switchboards, lighting and communication systems.

DEVELOPING MARKETABLE PRODUCTS AND THEIR PACKAGINGS—Ben Nash—*McGraw*, 404 p., tables and illus., $5. Analyzes the many considerations affecting design and development which influence the marketing success of mass-production products and processes, and demonstrates the actual procedures in product-package development

THE EARLY HISTORY OF THE IDEA OF THE INHERITANCE OF ACQUIRED CHARACTERS AND OF PANGENESIS—Conway Zirkle—*Am. Philosophical Soc.*, 151 p., $1.25. Transactions of the American Philosophical Society, vol. 39, part 2.

ELEMENTS OF BACTERIAL CYTOLOGY—Georges Knaysi—*Comstock Pub. Co.*, 209 p., charts and illus., $3.50. A textbook.

FAMILIAL NONREAGINIC FOOD ALLERGY, Arthur F. Coca, M.D.—*C. C. Thomas*, 191 p., tables and charts, $3.75. A new method of approach to the diagnosis and treatment of the relatively large group of allergic diseases in which the usual cutaneous tests fail almost entirely.

HELPING DISABLED VETERANS—*American National Red Cross*, 72 p., free. Simple facts about the physical and emotional symptoms of the disabled veteran and homely ways of making him comfortable.

INDUSTRIAL ELECTRICAL WIRING: Wiring Methods and Fittings—E. S. Lincoln—*Duell*, 336 p., tables and illus., $3. Analyzes phases of construction, operation, and maintenance of the systems for both a.c. and d.c. wiring recognized by the National Electrical Code.

INTERNAL COMBUSTION ENGINES—V. L. Maleev—*McGraw*, 636 p., charts and diagrs., $5. 2nd ed. Revised edition of a well-known manual providing a general foundation in the theory, design and operation of internal combustion engines.

MANUAL FOR WATER PLANT OPERATORS—A. A. Hirsch—*Chemical Pub. Co.*, 386 p., diagrs., $6.50. Latest developments in water technology and a comprehensive picture of correct operating practice; for use as a text or reference book.

ORGANIC REAGENTS FOR ORGANIC ANALYSIS—Staff of Hopkins and Williams Research Laboratory—*Chemical Pub. Co.*, 175 p., tables and diagrs., $3.75. Reference book on the use of organic reagents in preparing derivatives of organic substances for the purpose of identification by melting points.

PETROLEUM PRODUCTION—Volume 1—Park J. Jones—*Reinhold*, 228 p., diagrs., $4.50. The mechanics of production of oil, condensate, and natural gas.

PLANTS OF HAWAII NATIONAL PARK: ILLUSTRATIVE OF PLANTS AND CUSTOMS OF THE SOUTH SEAS—Otto Degener—*Edwards Brothers*, 314 p., illus., $2.50. First photo-lithoprint edition of "Ferns and Flowering Plants of Hawaii National Park, with descriptions of Ancient Hawaiian Customs and an introduction to the Geologic History of the Islands."

PRACTICAL PSYCHOLOGY—Karl S. Bernhardt—*McGraw*, 319 p., diagrs. and illus., $2.50. A textbook for beginners. Maintains a scientific viewpoint and at the same time vitalizes the subject matter by a wealth of practical information.

PRIMARY AND STORAGE BATTERIES—E. S. Lincoln—*Duell*, 168 p., diagrs. and illus., $3. The application and selection of dry cell, wet cell, caustic soda, and copper-oxide batteries; and of the lead acid and nickel-iron types of storage batteries. Also gives instruction for the selection and use of battery accessories.

PROCEEDINGS OF THE AMERICAN PHILOSOPHICAL SOCIETY, vol. 90, no. 1, Symposium on Atomic Energy and Its Implications. *Am. Philosophical Soc.*, 79 p., $1. Papers read at the joint meeting of the American Philosophical Society and The National Academy of Sciences, Nov. 16-17, 1945.

PROCEEDINGS OF THE CONFERENCE ON QUARTERMASTER TEXTILE RESEARCH—*Textile Research Institute*, 61 p., illus., $1. Papers on the wartime accomplishments of the Quartermaster Corps of importance to the textile industry; includes an outline of areas in which further research is needed.

REPORT OF THE NATIONAL ACADEMY OF SCIENCES:—Fiscal Year 1943-1944—National Research Council—*Government Printing Office*, 154 p., tables, 30 cents.

SOAP IN INDUSTRY—Georgia Leffingwell and Milton Lesser—*Chemical Pub. Co.*, 204 p., $4. Useful hints for chemists, manufacturers, salesmen in the utilization of soap in many manufacturing processes.

OUR TEEN-AGE BOYS AND GIRLS: Suggestions for Parents, Teachers, and other Youth Leaders—Lester D. Crow and Alice Crow—*McGraw*, 366 p., $3. Home, school, vocational and social adjustment of young people.

TRANSACTIONS OF THE WISCONSIN ACADEMY OF SCIENCES, ARTS AND LETTERS:—Vol. XXXVI—*Wis. Acad. Sci. Arts and Let.*, 495 p., tables and illus., $3. Papers in specialized fields in geology, ecology, anthropology, literature, etc.

VD MANUAL FOR TEACHERS—Samuel D. Allison and June Johnson—*Emerson Books*, 149 p., $2. An aid for building a program of venereal disease education in the secondary schools. Includes a survey of existing programs in this field, information for the teacher, and many suggestions for teaching aids.

Science News Letter, February 23, 1946

Reading Micromax Recorders in Penicillin Plant of Charles Pfizer & Co.

Tons Behave Like Ounces In Pfizer's Penicillin Vats

Tons of material used in the Pfizer penicillin plant are extracted while temperature and pH are regulated to within limits usually found only in lab work.

Information on which regulation is based does not however come from laboratory instruments. Micromax Recorders, which combine the lab's balance method with the plant's automatic mechanisms, are depended on.

If you're interested in instruments of similar usefulness, we will be glad to send catalogs.

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CHEMISTRY

New Process Makes Black Stainless Steel

➤ IF YOU GET articles of stainless steel that have a shiny black finish instead of the familiar bluish-white sheen, they will probably have been made by the process on which patent 2,394,899 was granted to I. C. Clingan of Baltimore, assignor to the American Rolling Mill Company. The black finish is obtained by immersing the stainless steel in a bath of molten potassium dichromate and sodium dichromate for from two to 30 minutes, at a temperature range of 320 to 500 degrees Centigrade.

Science News Letter, February 23, 1946

ELECTRONICS

Peacetime Radar

Marine systems must be reliable but not too costly, and capable of operation by the regular complement of officers of the ship.

▶ MARINE RADAR for peacetime use, to help avoid collisions and to save lives, property and time, must be properly designed for the job. The radar set on a vessel must be reliable, not too costly, have low minimum range, and be capable of operation by the regular complement of officers of the ship.

Military radar systems, developed for such varied purposes as surface search, aircraft detection, height finding, gunfire control, range finding and other wartime uses, were designed for these special purposes. The very design elements that produced excellent military radar are often those which make for an unsuitable peacetime radar, according to radar experts.

This is the opinion of L. H. Lynn and O. H. Winn, both of the General Electric Company, expressed at the meeting of the American Institute of Electrical Engineers in New York. They discussed the design requirements for peacetime radar, particularly as applied to surface ships.

"Maximum ranges of military equipment frequently exceed a hundred miles and require appropriate high power for such a range," they said. "A passenger ship is much more concerned with an obstacle which may be only several miles away, hence a large equipment is neither justifiable nor desirable."

"Minimum ranges of a destroyer's radar may well be a mile or two, on the theory that an enemy must be discovered long before he can approach that close," it was explained. "Minimum range of a radar for a cargo ship is required to be less than a ship-length, the shorter the better, in order that navigation may be safely accomplished in congested harbors."

Early in 1943, a modification of the military ship-borne search radar was installed as an experiment on an ore boat on the Great Lakes. It proved to be a highly useful navigational tool, the G-E engineers stated, but was too complex for non-technical personnel to use. As a result a relatively simple radar system was developed which is now called an "Electronic Navigator."

This has three units, antenna system, console and motor-alternator. The console, they explained, contains the transmitter, receiver, cathode ray tube, sweep circuits, pulsing circuits, rotating field mechanism, appropriate power supplies and controls.

"The pulse," they continued, "is considerably less than one microsecond in length and repeats at approximately 1000 cycles per second. Thus the peak power delivered to the magnetron is of the order of kilowatts, though the average power is but a few watts."

At the same meeting, R. C. Jensen and R. A. Arnett, also of General Electric, presented technical information on the peacetime role of airborne radar for navigation and obstacle detection.

Science News Letter, February 23, 1946

Vanilla was unknown throughout the world except to the Aztec Indians in Mexico until 1518, when Spaniards under Cortez landed at Vera Cruz.

Dithane, a new organic fungicide developed by the Connecticut Agricultural Experiment Station two years ago, is effective in controlling celery blight.

A *helicopter* has been used experimentally to deliver pipe for pipelines to inaccessible places in swamps and jungle; it carried 1,000 pounds of pipe strapped to the outside of the plane.

LIVE COCOONS

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•New Machines and Gadgets•

❁ *TIME-SWITCH clock turns the radio on and off for any desired programs. The electric device is placed in the circuit with the radio. It has 48 keys on its dial, any one of which when pulled out permits the timer automatically to close the circuit for 15 minutes.*

Science News Letter, February 23, 1946

❁ *SAFETY DEVICE for gas burners keeps liquids on the stove from extinguishing the flame when they boil over. It consists of an inverted circular convex disk that covers at least one of the inner rings of holes in the burner from which gas escapes, and protects them from boiling-over water.*

Science News Letter, February 23, 1946

❁ *COLLAPSIBLE decoy duck of rubber or rubberized fabric, just patented, remains upright in rough water because its under side is shaped like a large inverted cup. No weights are needed to maintain stability. When being readied for use, it is blown up like a football.*

Science News Letter, February 23, 1946

❁ *BARBECUING attachment for home cooking ranges, which constantly rotates the meat being cooked, is in a single unit that may be easily inserted in and removed from the broiler drawer of the electric or gas stove. A steam generator, part of the device, operates a motor that turns the spit.*

Science News Letter, February 23, 1946

❁ *ELECTRICAL manicurist consists of a small motor housed in a plastic box,*

a flexible cord to transmit rotary motion to the operation tools, and the tools themselves which provide disk filing, cuticle rolling, nail buffing and oil massaging. The simplicity of the device is shown in the picture.

Science News Letter, February 23, 1946

❁ *EGG DECAPPER cuts off one end of a soft-boiled egg without spilling the contents of the shell. The egg is placed upright in a special egg cup. The decapper is placed over the egg and an extended arm, carrying a cutting blade, is rotated.*

Science News Letter, February 23, 1946

❁ *HAND WASHING machine is a device to aid a man with only one hand to soap, scrub and rinse it with virtually no effort on his part. When he sticks his hand into the device, the rest is automatic.*

Science News Letter, February 23, 1946

❁ *HAIR CURLER of the spool type, with its surface gradually lessening in diameter from the ends toward its center, carries two rows of comb teeth to grip the strands of hair and hold them firm. The teeth points do not project beyond the outer circumference of the ends of the spool.*

Science News Letter, February 23, 1946

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, *1719 N St., N. W., Washington 6, D. C., and ask for Gadget Bulletin 299.*

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Question Box

AERONAUTICS

How great is the possibility of "push-button flying? p. 115.

ASTRONOMY

How many planets are visible during March? p. 122.

CHEMISTRY

What spray has been found effective in ridding cattle of ticks? p. 115.

DENTISTRY

What new tooth decay remedies are offered? p. 117.

ENGINEERING

How would a push-button telephone work? p. 121.

GEOLOGY

How dangerous is Crater Lake volcano? p. 120.

HOME ECONOMICS

What is a good way to thin honey? p. 124.

NUTRITION

How apparent is the difference between the new bread and the old? p. 119.

MATHEMATICS

What machine can add numbers in 1/5000 of a second? p. 118.

MEDICINE

How successful has streptomycin been in the treatment of tularemia? p. 117.

Who are Josie and Trixie? p. 119.

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